

Original Article

Consumption and knowledge of dietary supplements among young adult women in Lahore, Pakistan

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Citation: Farooq A, Saba NU, Khalid H, Rana MO, Nisar W. Consumption and knowledge of dietary supplements among young adult women in Lahore, Pakistan. Bull Pharm Med Res. 2023;2:12-20.

Received: 03 September 2023

Revised: 26 November 2023

Accepted: 09 December 2023

Published: 23 December 2023

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Abstract

Dietary supplements containing essential nutrients such as vitamins, minerals, and herbs are widely used to enhance overall nutrition and health. This study aimed to assess the consumption patterns and knowledge of dietary supplements among young adult women in Lahore, Pakistan. This cross-sectional study was conducted over three months at Lahore College for Women University; young adult women aged 18 to 25 years who were enrolled in any bachelor's degree program were recruited using a convenience sampling technique. The following data were collected using a self-administered questionnaire: demographic information, supplement usage, and perceptions. The data were analyzed using SPSS version 25.0 to calculate frequencies and percentages. Of the 333 questionnaires distributed, 303 were returned, resulting in a response rate of 90.99%. The mean age of the 303 participants was 23.06 ± 0.058 years, with 98.35% being unmarried. Most participants reported a monthly household income between 50,001 and 75,000 PKR (73.59%) and were predominantly in their fourth (44.22%) or fifth year (43.56%) of study, mainly in health sciences disciplines (72.28%). A majority (83.80%) reported taking dietary supplements, primarily for health enhancement (58.66%), improving bone and joint health (32.68%), and increasing muscle mass (37.01%). Supplements were mostly purchased from pharmacies (85.04%) and taken under the advice of doctors or nutritionists (74.80%). Common supplements included vitamins, calcium, and multivitamins, with most participants taking one supplement at a time (84.25%) and consuming them daily (35.04%) or 2-3 times per week (27.95%). Notably, 72.44% perceived benefits from taking supplements, and 49.61% intended to repurchase them. Concerns about potential side effects or interactions were also substantial (58.66%). This study revealed that young adult women in Pakistan frequently use dietary supplements for various health benefits, primarily by purchasing them from pharmacies and following healthcare professional advice. Despite positive perceptions and intentions to repurchase, concerns about safety and interactions remain.

Keywords

Dietary supplements; Young adult women; Social and administrative pharmacy; Women's health; Health awareness; Nutraceuticals

1. Introduction

A dietary supplement is a product containing essential nutrients, such as vitamins, minerals, herbs, and nutrient-rich foods, designed to enhance an individual's diet and improve the overall nutritional value of their food intake [1]. The Food and Drug Administration (FDA) defines dietary supplements as substances developed to improve a person's dietary intake [2]. Currently, their use has increased globally across all age groups to promote health benefits, ensure adequate nutrition, and enhance physical perfor-

mance [3]. Despite concerns about interactions with medications, supplements are used to treat medical conditions such as scurvy and rickets and may also help prevent diseases such as cancer and cardiovascular problems [4]. Many people view supplements as natural and safe for improving health and preventing disease [2].

Dietary supplements resemble drugs but are considered food consumed by users, who are consumers, not patients. This raises questions about whether these devices should be used by healthy or ill individuals. The growing supplement market offers a range of products, some with insufficient scientific validation. Many people use supplements due to perceived nutrient deficiencies in modern diets and increased awareness of the role of nutrition in health [5]. However, misconceptions about supplements and medications often lead to their simultaneous use without considering potential adverse interactions [6].

The use of dietary supplements has increased by approximately 50% over the past decade despite ongoing debates about their overall benefits [7]. In the US, adults frequently take vitamins, minerals, and plant-based supplements in various forms, and the literature indicates that over 43% of US children aged 4-8 years and 26% of teenagers aged 14-18 years use dietary supplements [8,9]. Similarly, 20.4% of Japanese children and adolescents use dietary supplements [10]. The 2015–2020 Dietary Guidelines for Americans recommend adequate intake of essential nutrients such as vitamins A, C, D, and E; choline; calcium; iron; magnesium; potassium; and fiber. Among these, vitamin D, calcium, potassium, and fiber are crucial due to their association with the prevention and management of chronic diseases. Moreover, supplements can enhance nutritional intake and reduce the risk of nutrient deficiencies. Consequently, most people use them for overall health improvement, making supplements popular for health and lifestyle benefits [11].

Experts typically recommend the use of daily multivitamins and increased nutrient intake for individuals to maintain adequate levels of essential nutrients that can potentially prevent chronic diseases [12]. Higher intakes of calcium and vitamin D are recommended for the prevention of osteoporosis, with vitamin D also playing a crucial role in disease prevention. Omega-3 fatty acids, specifically eicosapentaenoic acid (EPA) and docosahexaenoic acid (DHA), are beneficial for cardiovascular and brain function. Additionally, supplements such as glucosamine and chondroitin are known to improve joint health, while various botanical compounds provide practical health benefits [12].

While generally safe, dietary supplements are not without risk. For instance, water-soluble vitamins rarely cause toxicity, but excessive vitamin B6 intake can lead to sensory polyneuropathy in elderly individuals, and high doses exceeding 500 mg/day may result in photosensitivity and neurotoxicity. Overconsumption of fat-soluble vitamins can also be toxic; for instance, high doses of vitamin E (800-1200 mg/day) can cause bleeding, and even higher doses can lead to symptoms such as diarrhea, weakness, blurred vision, and gonadal dysfunction [13]. Given these potential risks and the widespread popularity of dietary supplements, particularly among young people, it is crucial to understand how these products are consumed and the level of knowledge about their use. This study aimed to assess the consumption patterns and knowledge of dietary supplements among young adult women in Lahore, Pakistan. Understanding these factors is essential for developing targeted educational programs and policies that can help mitigate risks and promote the safe and informed use of dietary supplements.

2. Material and methods

2.1. Study design and duration

This cross-sectional study was conducted over a three-month period from January to March 2023.

2.2. Study setting

This research was carried out at Lahore College for Women University (LCWU) in Lahore, Pakistan, where students from diverse socioeconomic backgrounds and various regions across the province of Punjab are enrolled.

2.3. Participant selection

The study included young adult women aged between 18 and 25 years who were enrolled in any bachelor's degree program at the university and consented to participate. We excluded participants enrolled from other provinces of the country or international students, as well as women with known gastrointestinal problems, nutritional deficiencies, cognitive impairments, or chronic illnesses such as diabetes and cardiovascular diseases. Furthermore, women who were pregnant, breastfeeding, or currently undergoing any medical treatment that could affect dietary supplement intake were not included. Finally, participants involved in other clinical studies were excluded to avoid potential confounding variables.

2.4. Sample size

The sample size was calculated using the Raosoft calculator with a margin of error of 5%, a confidence level of 95%, and a response distribution of 82.28% based on a previous study on women taking dietary supplements [14]. The sample size was calculated to be 222 participants, but it was increased to 333 to enhance the reliability of the findings and to accommodate any incomplete or missing data.

2.5. Sampling technique

The study participants were recruited using a convenience sampling method.

2.6. Survey development

A survey questionnaire was developed to gather information on the knowledge and usage of dietary supplements among young adult women. The questionnaire included sections on demographic details such as age, marital status, monthly household income, academic year, discipline of study, awareness and types of nutritional supplements taken, frequency of use, and reasons for usage. Participants were asked if they consumed dietary supplements, the reasons for intake, the usual purchase locations, the sources of advice, the types of supplements consumed, the number of supplements taken simultaneously, the weekly intake frequency, continuous usage without medical advice, observed benefits, future repurchase intentions, participation in health campaigns/workshops, perceptions of supplement safety, and potential side effects or interactions with food, drink, or other medicines [1,15].

2.7. Data collection

The self-administered questionnaires were distributed among the study participants, who provided written informed consent prior to inclusion. The principal and coprincipal investigators ensured that all participants were fully aware of the study's purpose, procedures, and their right to withdraw from the study at any time.

2.8. Ethical considerations

This study obtained ethics approval from the Research Committee of the Faculty of Pharmaceutical and Allied Health Sciences at Lahore College for Women University, Lahore, Pakistan (No. RC/PAHS/1127).

2.9. Statistical analysis

The data were analyzed using the Statistical Package for the Social Sciences (SPSS) version 25.0 (IBM Corp., Armonk, NY, USA) to calculate frequencies and percentages.

3. Results

Of the 333 questionnaires distributed, 303 were returned, for a response rate of 90.99%. Table 1 presents the demographic profile of the 303 young adult women included in the study. Their mean age was 23.06 years (SD = 0.058). The vast majority of participants reported being unmarried (98.35%). Concerning monthly household income, the largest segment of participants fell within the range of 50,001 to 75,000 PKRs (73.59%). Academic distribution revealed that most participants were in their fourth year (44.22%), followed closely by those in their fifth year (43.56%). Additionally, the majority of participants were enrolled in health sciences disciplines (72.28%), compared to nonhealth sciences (27.72%).

Table 1. Demographics of the young adult women (n = 303).

Characteristics		Frequency (%)	Mean \pm SD
Age (in years)		-	23.06 \pm 0.058
Marital status	Unmarried	298 (98.35)	-
	Married	5 (1.65)	-
Monthly household income (in PKR)	Below 25,000	15 (4.95)	-
	25,000 - 50,000	38 (12.54)	-
	50,001 - 75,000	223 (73.59)	-
	Above 75,000	27 (8.91)	-
Academic year	Third year	37 (12.21)	-
	Fourth year	134 (44.22)	-
	Fifth year	132 (43.56)	-
Discipline of study	Health sciences	219 (72.28)	-
	Nonhealth sciences	84 (27.72)	-

Of the 303 participants, the majority (83.80%) reported taking dietary supplements. Table 2 outlines the consumption patterns and knowledge of dietary supplements among 254 young adult women. The main reasons for supplement intake included health enhancement (58.66%), bone and joint health (32.68%), and increased muscle mass (37.01%). Pharmacies were the primary source for supplement purchases (85.04%), and advice from doctors or nutritionists (74.80%) was the most common source of guidance. Additionally, vitamins (27.17%), calcium (28.35%), and multivitamins (21.65%) were among the most frequently consumed supplements. Most participants reported taking one supplement at a time (84.25%) and generally took supplements daily (35.04%) or 2-3 times per week (27.95%). A significant portion perceived benefits from taking supplements (72.44%) and expressed an intention to repurchase them in the future (49.61%). Approximately one-third of participants had attended health campaigns or workshops on dietary supplements (31.89%), while concerns about potential side effects or interactions were notable (58.66%).

Table 2. Consumption pattern and knowledge of dietary supplements among young adult women (N = 254).

Questions	Frequency (%)
Do you take dietary supplements?, (N = 303)	Yes
	254 (83.80)
	No
	49 (16.20)
Dietary supplements intake reasons	Weight reduction
	39 (15.35)
	Health enhancement
	149 (58.66)
	Muscle mass increase
	94 (37.01)
	Aesthetics purposes
	15 (5.91)
	Bone and joint health
	83 (32.68)
Where do you usually purchase supplements?	Pharmacy
	216 (85.04)
	Website
	8 (3.15)
	Social media platform
	5 (1.97)
	Departmental store
	25 (9.84)
Source of advice for taking dietary supplements	Doctor/nutritionist
	190 (74.80)
	Scientific magazine
	3 (1.18)
	Friends
	28 (11.02)
	Website/social media
	26 (10.24)
	TV ads
	7 (2.76)
Types of supplements typically consumed	Vitamins
	69 (27.17)
	Minerals
	34 (13.39)
	Proteins and amino acids
	40 (15.75)
	Fats
	7 (2.76)
	Dietary fiber
	21 (8.27)
	Herbs and botanicals
	41 (16.14)
	Calcium
	72 (28.35)
	Iron
	54 (21.26)
	Omega-3 fatty acids
	24 (9.45)
	Probiotics
	37 (14.57)
	Multivitamins
	55 (21.65)
	Antioxidants
	27 (10.63)
	Others
	10 (3.94)
How many supplements do you usually take at the same time?	One
	214 (84.25)
	Two
	33 (12.99)
	Three or more
	7 (2.76)
	Daily
How many times per week do you take dietary supplements?	89 (35.04)
	2-3 times per week
	71 (27.95)
	3-5 times per week
	66 (25.98)
	More than five times per week
	28 (11.02)
Do you usually continuously take them for more than three months without medical advice?	Yes
	32 (12.60)
	No
	194 (76.38)
	Sometimes
	28 (11.02)
Have you noticed the benefits of taking supplements?	Yes
	184 (72.44)
	No
	15 (5.91)
	Do not know
	55 (21.65)
Will you repurchase them in the future?	Yes
	126 (49.61)
	No
	13 (5.12)
	When necessary
	115 (45.28)
Do you think the use of supplements is always safe?	Yes
	81 (31.89)
	No
	170 (66.93)
	Do not know
	3 (1.18)

Have you attended any health campaigns/workshops on dietary supplements?	Yes	81 (31.89)
	No	173 (68.11)
Do you think taking dietary supplements with food, drink, or other medicine might have side effects or interactions?	Yes	149 (58.66)
	No	54 (21.26)
	Do not know	51 (20.08)

4. Discussion

This study investigated the consumption patterns and perceptions of dietary supplements among young adult women in Pakistan. The demographic analysis revealed that the participants were predominantly unmarried and from middle-income households, with most enrolled in health sciences disciplines and in their fourth or fifth academic year. The majority of participants reported taking dietary supplements, primarily for health enhancement, bone and joint health, and muscle mass increase. Pharmacies were identified as the main source for purchasing supplements, with advice from doctors or nutritionists being the most common source of guidance. The most frequently consumed supplements were vitamins, calcium, and multivitamins. Participants generally reported positive perceptions of the benefits of supplements, with many indicating an intention to repurchase them in the future. However, concerns about the safety and potential interactions of dietary supplements are also prevalent.

Our study results are supported by a study conducted in the United Arab Emirates that reported 72.3% of health sciences students and 27.7% of nonhealth sciences students, highlighting the high prevalence of dietary supplement use among young adults [16]. This may be due to the high usage of social media among young people, who are more inclined to take dietary supplements than are their older counterparts. It is well known that social media platforms, websites, and mobile phone applications are effective means of information dissemination. These media inspire young individuals to use various products, such as nutritional supplements, for a healthy life [17,18].

A Chinese study also supported our study findings, highlighting that supplement users are typically more health conscious than nonusers, considering their food choices and overall lifestyle [19]. An Italian study concluded that most supplement users, both males and females, reported taking supplements to balance their diet and gain health benefits [9]. Furthermore, the use of dietary supplements may have gained popularity among young adults because they consider nutrition to increase the immune system's ability to fight certain infections. Studies have reported deficiencies in specific micronutrients among COVID-19 patients, which healthcare providers have addressed by prescribing certain types of nutritional supplements. This prescribing trend, initiated during the pandemic, has continued and may also contribute to the high use of dietary supplements among young adults [20,21,22].

Our study revealed that most of the participants used at least one supplement on a daily basis, which contrasts with a study conducted among different university students in the United States (US) that revealed that most students consumed at least one supplement per week [23]. However, the same study supported our findings that vitamins are the most commonly used supplements, followed by amino acids and calcium. Moreover, our study results contradict those of a Polish study that reported that proteins were the most preferred dietary supplements, followed by minerals and vitamins [24]. In the US, more than half of women above the age of 50 use calcium supplements. However, individual variations and physical activity can significantly influence the consumption and selection of different types of dietary supplements based on lifestyle and physiological needs [25,26,27].

Our findings are in line with a study that highlighted that a limited number of respondents were aware of the safety profile of nutritional supplements [1]. However, excessive consumption of these supplements can be dangerous, leading to toxicity and other health issues, which may result from limited knowledge about their use among the general population due to a lack of communication between physicians and patients [28,29,30]. Currently, dietary supplements are advertised in an appealing manner and are available as over-the-counter commodities, making them easily accessible without the consultation of a healthcare professional, which is particularly concerning [5]. This easy accessibility, combined with a lack of proper guidance, highlights the need for improved communication and education about the safe use of dietary supplements.

The present study targeted young adult women from diverse socioeconomic backgrounds to understand their dietary supplement consumption patterns and knowledge using a comprehensive assessment tool, providing valuable baseline information from the local context, which is a significant strength. However, the study did not consider qualitative parameters or explore the underlying reasons why females consumed dietary supplements, which is a limitation. Furthermore, the cross-sectional nature of the study limits the ability to establish causality, and the absence of inferential statistics marks another potential weakness. Future studies may include women of all ages with larger sample sizes to draw inferences about the broader population.

5. Conclusions

This study revealed that young adult Pakistani women frequently use dietary supplements for health enhancement, bone and joint health, and muscle mass improvement. The most common supplements, including vitamins, calcium, and multivitamins, are primarily purchased from pharmacies and are used under the guidance of healthcare professionals. Despite positive perceptions and intentions to repurchase, concerns about safety and interactions persist. Future research should include more diverse demographic and qualitative parameters to better understand supplement use across different sociodemographic factors.

Author contributions: Conceptualization, AF, NUS, HK, MOR, and WN; methodology, AF, NUS, HK, MOR, and WN; software, WN, MOR; validation, NUS, and HK; formal analysis, WN, and MOR; investigation, AF, NUS, and HK; resources, NUS, and WN; data curation, WN, and MOR; writing—original draft preparation, AF, HK, MOR, and WN; writing—review and editing, NUS; supervision, NUS, and WN; project administration, NUS. All authors have read and agreed to the published version of the manuscript.

Funding: This research received no specific grant from the public, commercial, or not-for-profit funding agencies.

Ethics statement: This study obtained ethics approval from the Research Committee of the Faculty of Pharmaceutical and Allied Health Sciences at Lahore College for Women University, Lahore, Pakistan (No. RC/PAHS/1127).

Consent to participate: Written informed consent was obtained from all participants prior to data collection.

Data availability: The data supporting this study's findings are available from the corresponding author, Noor, upon reasonable request.

Acknowledgments: None.

Conflicts of interest: The authors declare no conflicts of interest.

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